# NEED OF SIX SIGMA IN EDUCATION

By

DHEERAJ MEHROTRA*

*ABSTRACT*

*The marching trend of the new economic order has generated a new capsule of SIX SIGMA as a unified approach to process excellence. The tests reveal that it has transformed some of the most successful companies in the world like Motorola, GE etc. It is activated as an approach to aiming at the target by changing the culture of a company, involving everyone in the company, not just the Black Belts and Green Belts. The concept of SIX SIGMA is to identify the problem in a process, set up project with the processes, evaluate the process and work through the project in order to improve the process in totality. In the words of Jack Welch, Chairman of GE, the SIX SIGMA, is "The only programme I've ever seen where customers win, employees are engaged in and satisfied by, shareholders are rewarded, and everybody who touches it wins." In education it pertains to improving quality of matter taught, the character generated of the pupils in certain and the quality of study and school life. With the revolutionary usage of audiovisual devices, like projectors, video conferencing, etc., the students can also be asked to write papers on a particular subject and after the presentation of papers, the discussion can take place on the respective subject. Under this method of imparting knowledge of literacy with quality, the thinking, writing and presentation skills of the students can be kindled. Not only this, the existing method of quality improvement through SQCC (Students Quality Control Circles) have had the value based concept as a simile for the Six Sigma standards. It infuses a spike of excellence, emotional development, humaneness and self discipline.*

## INTRODUCTION

### *Origin of Six Sigma*

The concept of SIX SIGMA originated in the 1980' as Motorola in response of the threat of Japanese counterpart got excited of the zero defects. Further the concept broomed to Allied Signal and General Electric (GE), as a result it became a news in 1996, that GE had made over $1Billion of cost savings. In academics it is still in infancy stage. It is dependent on the management gurus for implementation.

### Target and Techniques of Six Sigma

The SIX SIGMA tends to raise customer satisfaction by reducing the number of defects from a process to 3.4 defective per million. The progress towards the target is measured by the sigma rating. If it can not be measured, it is bound to have a raise instead. Again in academics, it standardises the enhancement of the result by percent increase. The defects here symbolises the failures or the third divisioners.

### What & Why of Six Sigma ?

Six Sigma applies a systematic methodology for improving organizations' processes, based on rigorous data gathering and analysis. The approach focuses on helping organizations produce products and services better, faster, and smarter by improving the capability of processes to meet customer requirements. Six Sigma identifies and eliminates costs that add no value to customers. Unlike simple cost-cutting programs, however, Six Sigma delivers cost cuts while retaining or improving value to the customer.

Six Sigma is a highly disciplined process that helps an organization to focus on developing and delivering perfect products and services. The methodology is based on established statistical process control techniques and data analysis methods. It features systematic training of all personnel involved in the activity or process targeted by the program.

The Greek letter $\sigma$ (sigma) is a mathematical symbol that represents a measure of variation, i.e, the distribution around the mean of any process or procedure. The term "Six Sigma" mathematically defines an optimum measurement of quality i,e, 3.4 defects per million events. If an organization can reduce its product's average deviation, then less of it will be faulty and cost saving result. In other words, do it right by progressively monitoring and

eliminating mistakes.

Understanding what the customer considers, "critical to quality" is a cornerstone of any successful Six Sigma initiative. The link between Six Sigma and business process thinking often determines the span and depth of performance improvement. Both incremental business process improvement and Six Sigma are intended to develop focused solutions to eliminate root causes of business performance problems without radically changing existing processes or organizational structure.

### Culture of Six Sigma

The work environment or the quality of work life suggests the culture which permeates a company in the desire of all staff to achieve that target, to increase customer satisfaction, to increase efficiency, lower costs and improve profitability. This culture provides an important and continuing focus to management. The quality of SIX SIGMA penetrates applying to all of a company's business, whether 'defective' means an out-of-specific time coming off a production line, the amount of 're-work' in a batch of a product, a document with a misprint, or an overlong delivery time. Now, the implementation in the educational arena requires the significance of the teaching fraternity as the employees or the workforce in general. The customers tend to be the parents who pay the fees and want quality in return as a good result for their wards.

### Application of Six Sigma in Educational Institutions

The following are some of the common processes in the educational institutions which can be significantly improved by applying the Six Sigma methodology:

- academic achievement
- the process of college admission
- teaching and academic programs
- study program and process
- institutional effectiveness
- student learning performance
- evaluation of the instructional delivery
- the accreditation process.

The implementation or application starts with the recognition of a problem, and the defining of a project to cure or alleviate that problem. The dependence of any standard of academic or production is totally dependent on the following format of DMAIC. The project is undertaken by a team using DMAIC, meaning DEFINE, MEASURE, ANALYSE, IMPROVE and CONTROL. These are defined well as:

*DEFINE :* The definition of the project/ assignment, using process map, application area, desired improvement, likely benefits etc. The importance lies in having the chance of a high successful delivery for better quality and saving costs in total. In this context of academic strata, the failures include the definition of the problem as an identity. The others may include projects like real life problems pertaining to "Distractions in the Class Room" for example.

*MEASURE:* This involves the analyses of the process to determine its present state and the future, as obtained. The data collection is a well suited frame for this.

*ANALYSE:* This involves the data analysis for identification of parts of process which affect the quality of the problem.

*IMPROVE:* This adds up to the process to find a permanent solution to the problem. This may involve better forecasting, better scheduling, better procedures or better equipment, specifying teaching techniques, work environment for the teachers and school campus quality life.

*CONTROL:* Involves the process of closing the problem by putting the right procedures and management statistics.

### Six Sigma Professionals

#### *As in Academic Institutions*

*Black Belts*

They represent the Six Sigma experts with a thorough grounding and with the ability to lead the projects, an upper hand over Green Belts. The incharges of Senior School include in this gentry. In industries, the project leader is called a Black Belt (BB). All BB candidates should have a history of accomplishment. A BB assignment typically lasts for two years, during which the BB leads from eight to twelve projects, each lasting approximately one

quarter (large projects are broken down into segments of approximately one quarter). The projects will likely come from different business areas, thereby giving the BB a broader view of the business. Reporting on the projects and documenting their impact are important aspects of the BB experience. They enhance the fast-track aspects of the BB experience.

*Green Belts*

These represent the Six Sigma Practitioners, with a thorough grounding of the approach. The Incharges of the Junior School, and Primary School activate as these designators. The project team members are called Green Belts (GBs), and they do not spend all their time on projects. GBs receive training similar to that of BBs, but for less time. They typically get their training to participate in an important project for their business. Six Sigma project participants, such as BBs and GBs, tend to be agents of change who thrive into the new business climate of constant change. They are open to new ideas and are used to evaluate new ideas rigorously .

*Master Black Belts*

These represent people who spend their time on SixSigma, assist leadership for projection and consultation. The Administration Officer or the Vice-Principal acts in this position. Master Black Belts (MBBs) are resources for the project teams. MBBs are often experienced BBs who have worked on many projects. They generally have knowledge of advanced tools, business and leadership training, and teaching experience. A primary MBB's responsibility is training and mentoring new BBs in the organization.

*Champions or Leaders*

They are the senior managers who ensure that resources are available for training and projects, and also conduct reviews. The Principal activates this goal, in collaboration with the management.

### Implementation of Six Sigma

With the outcome of the implementation of this novel concept, researchers have found that successful deployment of Six Sigma involves focusing on a small number of high-leverage items. The following are the steps needed for the successful implementation of this concept:

- The success improvement must start from the senior level of leadership. This is done by providing training of the principles and the tools needed for the purpose. Simultaneously, the steps are taken to "soft-wire" the organization and to cultivate an environment for innovation and creativity.
- The module is developed for establishing close communication with customers, employees and suppliers. This involves developing rigorous methods of obtaining and evaluating customer, employee and supplier input. The teachers will provide this database for reporting and conducting the study.
- The assessing is made of training, as an indispensability. The remedial basic skills of education is also provided to ensure the adequate levels of literacy and numeracy, which are processed by all employees/ teachers.
- A standardised framework for continuous improvement is developed with a system of indicators for monitoring progress and success.
- The six sigma projects are conducted by individual employees and teams lead by Green Belts and assisted by Black Belts.

With the above mentioned mode of conduct for the implementation of SIX SIGMA, the research proves that firms that successfully implement Six Sigma perform better in virtually every business category, including return on sales, return on Investment, employment growth, and share price increase to the level of production within an organisation. These techniques, as an essential tool for productivity and enhancement of quality, leaves an everlasting strategy at the need of the day. What strategy has to be applied in today's educational arena is a thoughtful concern on the part of the management to dwell into. The above mentioned management techniques are a proven methodology of success by one and all, and pertains to KAIZEN or the continuous improvement philosophy.

*How to implement?*

First, identify the organization's key business processes that deliver value directly to the customer and stakeholder. Most educational institutions have between 5-8 core customer and/or mission-critical business processes. These processes include college admissions, academic achievement, faculty and staff development, academic process management and improvement planning. The next step is to map these processes at a mid level and measuring the current process results. As detailed process flows, one can find the work-instruction level, which aren't necessary in this context. Instead, outlining the major handoffs between functional organizations of the business would be effective. Next, identify the most important issues or "disconnect" between the customer and the school/educational institution's perspective, and involve the leadership team in prioritizing them.

Next step is to decide the required scope of improvement and whether to perform process improvement or process redesign. Process improvement usually fixes a segment of a larger process, whereas process redesign involves building a new process to replace an old one. Initially, small to medium-sized schools/colleges should begin by performing process improvement using basic Six Sigma methodology and then measure the results and quantify the savings.

Although these steps appear straight-forward, they need much efforts to put into. In fact, the following are just some of the elements needed for success:

- Visible top management commitment
- Keen sense of urgency
- Clear definition of customer/stakeholder requirements
- Shared understanding of core processes and key customers/stakeholders
- Honesty in measuring current performance
- Discipline in prioritizing the critical improvement projects
- Communicating success stories and proving that the approach works well
- Rewarding and recognizing the performers
- Institutionalizing the approach.

*A Rising Example on Implementation of Six Sigma In Education*

Teachers, according to Hodges (who is one), are great at solutions. Often before they have even identified the problem, they can have a single or set of solutions in hands. So, Hodges in his every meeting with teachers asks these questions:

- What's the problem?
- How do you know?
- What are some of the root causes?
- What treatment can we apply?
- What are the results likely to be?

After many repetitions of this process, the teachers began to see the value of identifying the problem before tackling how to fix it, Hodges said. One story in particular illustrated how understanding a complaint is required for the understanding of a real problem:

Many of the teachers frequently complained among themselves about the poor air circulation within the classrooms. Poor air quality led to increased absences, asthma attacks and labels of "sick building syndrome." The problem was examined carefully using a Six Sigma approach. An environmental specialist was involved, and data was gathered and analyzed by a team consisting of a teacher and a custodian. What they found surprised everyone. Some of the teachers kept animals in their classrooms, with no protocol for caring for them or cleaning the cages or for other husbandry issues. Some teachers, for lack of appropriate space, had placed books, papers and other materials on top of ventilators, thereby blocking air circulation in those rooms.

Once the factors were identified and analyzed, curative measures were discussed, chosen and implemented. The result of the Six Sigma project was fresh air circulation in the classroom. Also, the teachers were thrilled as their grievances had been listened to, and a solution had been found. To top it off, the school district was honored

with an indoor air quality award.

With the careful use of the methodology, the teachers analyzed every aspect of the problem, and began to see that it was quantifiable. The result was to pilot one textbook through the ninth and tenth grade levels (and advanced eighth grade) in all schools in the district. At the end of that period, with all students literally "on the same page," they would be able to test on a particular core of knowledge. Test results would be quantifiable, and there would be the added benefit of a cost savings. With all the schools buying the same textbooks, a larger discount could be negotiated.

### Six Sigma for the Future

Hodges is full of ideas for new projects and issues that he has long wanted to explore, both on the business side and the educational side. Among these are:

- Using a web-based system (which already exists) to assess what the students actually know.
- Employing an internet resource to order textbooks, so that one person, and not four, can order books for the coming school year, and then check the distribution of those books as they are shipped to the various schools.
- Finding out why teachers are hired to perform one function, and end up doing something is entirely different, and this happens quite frequently.

Hedges noted, A workable on-line system for applications for teaching positions is one of his pet projects. The district had one, "but no one used it," he said. A new system is now under development. It is being designed with data gathered from analyzing and testing the old system which had multiple deficiencies. The concept to eliminate some of the paperwork in job applications was admirable. "But there was no customer satisfaction in the program," Hodges said. The old on-line system was difficult to use, cumbersome and tended to quit on users before they had finished the application.

The best thing about Six Sigma in the schools, according to Hodges, is that, with help of his colleagues, he has been able to effect change in areas that everyone agreed, and needed serious overhauling. Six Sigma is now so integral to see how things are done in this school system that Hedges teaches it in his classes. "I teach students to follow the same methodology I've had in their teachers use." What lies the fact is the inception of this tools of productivity and Quality as the essential factors of Education towards excellence. Universal acceptability of these factors is the need of the hour.

### References

[1]. Six Sigma in Education ...www.sixsigma.com/library/content/c011029a.asp

[2]. Applying Total Quality Management In Academics Www.isixsigma.com/library/content/c020626a.asp

[3]. Quality in Education: Quality In Education? www4.asq.org/blogs/edu/2005/11/quality_in_education.html

[4]. jGuru: Dheeraj Mehrotra's Forum Answers ...Jguru.com/guru/viewforumanswers.jsp?EID=1255995

[5]. Attaining Quality Through Literacy by Dheeraj Mehrotra indianest.com/opinion/0052.htm - 31k

[6]. Informing Science Institute ::: Main Page informingscience.org/

[7]. About Six Sigma From Dheeraj Mehrotra and SixSigma. www.i6sigma.com/me/six_sigma/default.asp

[8]. Applying Total Quality Management In Academics Europe.isixsigma.com/library/content/c020626a.asp

[9]. Total Quality Management In Education :totalqualitymanagement.icestotal.com/totalqualitymanagementineducation/ -

[10]. Software quality assurance testing - an introduction: www.more-quality.com/ -software-quality-assurance-testing.htm

[11]. Transactional Best Practices: www.healthcare.isixsigma.com/bp/transactional/

## ABOUT THE AUTHOR

**Head, TQM in Education, City Montessori School & Degree College, Lucknow, INDIA*

*Mr. Dheeraj Mehrotra is the Head of the Total Quality Management Department at City Montessori School & Degree College, Lucknow, INDIA. He is a prolific writer/ author with over 500 write-ups to his credit on IT and Quality Education Issues apart from 24 Publications of Computer Science as a subject for school and college students. His major achievements include implementation of SIX SIGMA in Education (Source: www.isixsigma.com) He is the Resource Person for the Computer Applications for the Association of Schools for the ISC. His qualifications include, MS (Education Management) with Post Graduate Courses in Computer Science, Business Management, Teacher Training, Journalism and Human Resource Management. He is the recipient of the NATIONAL AWARD for innovation in Education for implementing and Mastering Classrooms through IT and QCC in Education, in the year 2003. His team was also awarded the Computer Literacy Excellence State Award. He was recently honored by the PRESIDENT of INDIA for being the NATIONAL BEST TEACHER for the year 2005 being recommended by the council, on 5th Sept. 2006.*